DRAFT, Version 1.1

Draft Management Recommendations for
giant brownwort
Tritomaria quinquedentata (Huds.) Buch

Version 1.1
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EXECUTIVE SUMMARY

Species: *Tritomaria quinquedentata* (Huds.) Buch (giant brownwort)

Taxonomic Group: Bryophyte: Liverwort

ROD Components: 1,3

Other Management Status: This species is listed by the Oregon Natural Heritage Program (List 3) indicating that information is needed before status can be determined, but it may be threatened or endangered in Oregon or throughout its range within the conterminous United States (1995). It is considered a Bureau Tracking Species in Oregon by the Bureau of Land Management.

Range: *Tritomaria quinquedentata* is known from four sites within our range, three on the Mt. Baker Snoqualmie National Forest in Whatcom County, Washington, and at Saddle Mountain State Park, Clatsop County, Oregon.

Specific Habitat: *Tritomaria quinquedentata* occurs in arctic boreal-like environments in cool, moist refugia associated with cold water streams in the Oregon Cascades. Generally, it occurs on wet humus over boulders, shaded cliffs, on soil over exposed rock surfaces, and on decaying branches at the fringes of a spray zone (Hong 1994), often near seeps or streams.

Threats: This species may be a glacial relict in our area, now restricted to a limited number of sites. The main threat to this species is the loss of cool, moist, glacial refugia--sites that were presumably more abundant in the region during or immediately following glaciation. Disturbance of these rare sites by activities which modify microclimate may result in the local extirpation of these species. The limited amount of suitable habitat may reduce the likelihood of colonization of adjacent sites. It is considered at high risk as it is uncertain that viable populations now persist.

Management Recommendations:

- Maintain habitat (e.g., intact wet humus and soil, cool air, cold water) for this species at all known sites. Avoid disturbance, including modification of canopy and soil layer.
- Limitation of special forest product harvest in the vicinity of known sites should follow the recommendation of the botanist/ecologist; however, given its typical rock substrate it is not anticipated that collection of bryophytes as special forest products would impact this species.
- Restrict collection at known sites.
- Minimize impacts from recreation associated actions, including trampling.

Information Needs:

- Revisit known sites to document population status and determine ecological requirements.

C Conduct inventory to locate additional populations, particularly in Late-Successional Reserves, Research Natural Areas and other withdrawn areas and in areas where management activities are proposed or planned.

I. Natural History

A. Taxonomic/Nomenclatural History

Tritomaria quinquedentata (Huds.) Buch was originally described as *Jungermannia quinquedentata* Huds. It has no recent synonyms. It is placed in the class Jungermanniales, family Jungermanniaceae.

B. Species Description

1. Morphology (Frye and Clark 1945:421, Hong 1994, Kitagawa 1966:117, Schuster 1969:678, Smith 1990:128, Christy and Wagner 1996)

Tritomaria quinquedentata is a **large** green to yellow-brown or pale brown leafy liverwort, often forming extensive, sprawling patches. It is usually intermingled with other bryophtyes. Stems are 1.5 to 5 cm long, typically prostrate with upturned tips, remotely branched, dorsal side green, ventral side brown. Rhizoids are long and form dense mats. **Leaves are in two rows down the stem**, contiguous to imbricate (overlapping), widely spreading, orbicular-ovate, strongly asymmetrical, leaves usually wider than long, **strongly unequally trilobate** (rarely four-lobed), with cuspidate (ending abruptly in stout rigid point) lobed apices. Dorsal lobes are transversely inserted, apiculate to cuspidate. Ventral lobes are larger and obliquely inserted. Sometimes dorsal lobes are folded over ventral lobes, the leaf then loosely complicate-canaliculate (folded lengthwise-channeled). Trigones (thickened corners of cells) are usually small, not bulging. Three to seven oil bodies are present in each cell. Underleaves are absent. Gemmae are rare. Perianths are frequent and emergent.

The large size and asymmetric three-lobed leaf are useful field characters to help distinguish *Tritomaria quinquedentata*. It can be separated from similar appearing *Lophozia* subgen. *Barbilophozia* by the lack of both underleaves and cilia on the ventral base of the leaves. Other *Tritomaria* species produce abundant gemmae (small vegetative reproductive bodies consisting of a few cells).

Figure 1. Line drawing of *Tritomaria quinquedentata* from Schuster (1969) (to be added). (AWAITING COPYRIGHT PERMISSION)

2. Reproductive Biology

Tritomaria quinquedentata rarely produces asexual gemmae. The species is dioecious, with male plants occurring in separate patches. Sexual reproduction is apparently common, perianths are frequently observed. Like all bryophytes, it requires water for sexual reproduction.

3. Ecology

Tritomaria quinquedentata occurs in moist to wet, shaded conditions. In general, liverworts are intolerant of desiccation.

C. Range, Known Sites

Tritomaria quinquedentata is known from four sites within our range, three on Mt. Baker-Snoqualmie National Forest in Whatcom County, Washington, and on Saddle Mountain, Clatsop County, Oregon (Saddle Mountain State Park). The three sites in Washington are within a 6.5 km (4 mile) radius of the historic site of Shuksan on the Nooksack River and range from 700 to 1400 m (2300 to 4600 ft.) in elevation. Hong reports seven sites of *Tritomaria quinquedentata* in western Washington, however, only three collections have been located. Saddle Mountain is the site of many disjunct rarities, including other Survey and Manage bryophytes *Diplophyllum albicans, D. plicatum, Herbertus aduncus, H. sakurali, Iwatsukiella leucotricha, Plagiochila semidecurrens, Racomitrium aquaticum,* and *Ulota megalospora*.

Globally, this species is circumboreal, found throughout most of the tundra and taiga regions of the northern hemisphere. In North America it is transcontinental. In western North America, its range extends from Alaska and the Yukon south throughout British Columbia and Alberta, south through Washington, and east to Montana and Colorado.

Figure 2. Known sites of *Tritomaria quinquedentata* (to be added).

D. Habitat Characteristics and Species Abundance

Tritomaria quinquedentata occurs in arctic boreal-like environments in cool, moist refugia associated with cold water streams in the Oregon Cascades. Generally, it occurs on wet humus over boulders, shaded cliffs, on soil over exposed rock surfaces, and on decaying branches at the fringes of a spray zone (Hong 1994), often near seeps or streams. It is reported from a seepy north-facing cliff at Saddle Mountain. In Washington it is reported from crevices in boulders, moist seeps in open meadows, and on shaded slopes by a stream. Associated species of liverworts include *Anastrophyllum minutum, Cephalozia lunulifolia, Diplophyllum taxifolium, Geocalyz gravelens, Gymnmitrion coralloides, Lophozia heterocolpos, L. Sudetica, Odontroschisma macounii, Ptilidium ciliare,* and *Scapania americana* (Hong 1994).

This species may be more widespread than has been currently documented and is probably undercollected (Schofield, pers. comm.). It was reported to be abundant at several of the known sites at the time of collection.

II. Current Species Situation

A. Why Species is Listed under Survey and Manage Standards and Guidelines

Tritomaria quinquedentata was not rated during the bryophyte viability panels (Forest Ecosystem Management Assessment Team 1993) because of limited information. It appears to be rare in the Pacific Northwest and was included as under Survey and Manage Strategies 1 and 3 in the Record of Decision (USDA and USDI 1994). The basis for its inclusion was to maintain viability at the known sites and to conduct inventories to learn more about the actual extent of its range, abundance, and associations. All historical collections have been made between the years of 1969 and 1978 and have not been recently relocated.

This species is believed to be at high risk due to the uncertainty that viable populations still exist within the area of consideration.

B. Major Habitat and Viability Considerations

Tritomaria quinquedentata is known from very few sites based on our current knowledge. The major viability considerations are loss of habitat and inadvertent extirpation from sites that are not known. Climate change is an additional concern for *Tritomaria quinquedentata*, as warming climate may restrict suitable habitat.

C. Threats to the Species

This species may be a glacial relict in our area, now restricted to a limited number of sites and potential habitat may be limited. Disturbance of these sites from activities which modify microclimate, may result in the local extirpation of these species. Activities associated with recreation are the most likely threats to the known populations which occur in popular recreation areas. The limited amount of suitable habitat may reduce the likelihood of colonization of adjacent sites.

D. Distribution Relative to Land Allocations

One known site is located within the Mt. Baker Snoqualmie Wilderness Area, one is located east of Silver Fir Campground, and one is located in a heavily used recreational area near Austin Pass. The Oregon site is located within Saddle Mountain State Park.

III. Management Goals and Objectives

A. Management Goals for the Taxon

The goal for the management of *Tritomaria quinquedentata* is to assist in maintaining species viability.

B. Specific Objectives

- Maintain cool, shady, wet to moist site conditions and avoid disturbance of substrate upon which this species lives and associated microclimate.
- Minimize recreation and collection impacts.

IV. Habitat Management

A. Lessons from History

No specific information is available at this time.

B. Identification of Habitat Areas for Management

The three known sites of *Tritomaria quinquedentata* on the Mt. Baker Snoqualmie National Forest are identified as areas where management should be implemented to maintain the viability of known populations. If additional sites are located, they should also be identified as areas for management.

C. Management within Habitat Areas

The three known sites occur in areas that are not allocated for timber management activities. At the known sites, maintain current arctic boreal-like habitat and microclimatic conditions (e.g. intact wet humus and soil, cool air, cold water). Minimize impacts from recreation and associated actions including trampling. Prevent disruption to the soil layer and modification of the canopy. Maintain undisturbed riparian areas in good condition in vicinity of known sites where they may influence known sites. Due to the extremely limited number of sites and diocious reproduction, no collecting should be allowed at the known site, unless specifically approved.

D. Other Management Issues and Considerations

No other management issues are identified at this time.

V. Research, Inventory and Monitoring Needs

A. Data Gaps and Information Needs

Visit the known sites to verify population status and document ecological conditions to assist in the location of additional populations. Survey potential suitable habitat (e.g., within vicinity of the Shuksan). The additional four sites in Washington, mapped by Hong (1994), should be located and identified, by contacting him for more specific information. In addition, contact other bryologists (e.g., R. Schuster) who may have additional information on eastern North American

populations.

B. Research Questions

- What is the ecological amplitude of *Tritomaria quinquedentata*?
- What factors limit its distribution?
- Is this species a glacial relict?

C. Monitoring Needs and Recommendations

No monitoring recommendations are made at this time. Once the populations are relocated, periodic site visits to evaluate the status of *Tritomaria quinquedentata* at the known sites will be necessary to determine population trends. In addition, sites should be checked for evidence of impacts, including collecting.

VI. References

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